Section 3 – 320 Amp and Larger – Common

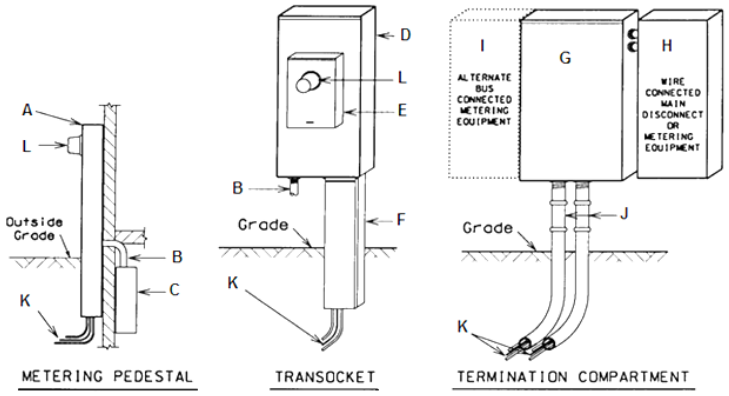
3-1 Basic Requirements

Name of Parts for Underground Service

Customer furnishes and installs:
A – Meter pedestal
B – Service entrance conduit and conductors
C – Distribution panel, main fuse/disconnect
D – Transocket
E – Transformer rated meter socket
F – Wiring trough (1600 amp maximum)
G – Termination compartment, either wire or bus connected type
H – Metering or main disconnect/fuse, wire connected for use with wire type termination compartment only

Customer furnishes and installs:
I – Metering equipment, bus connected for use with bus connection type termination compartment only and of same manufacturer
J – Service lateral conduit

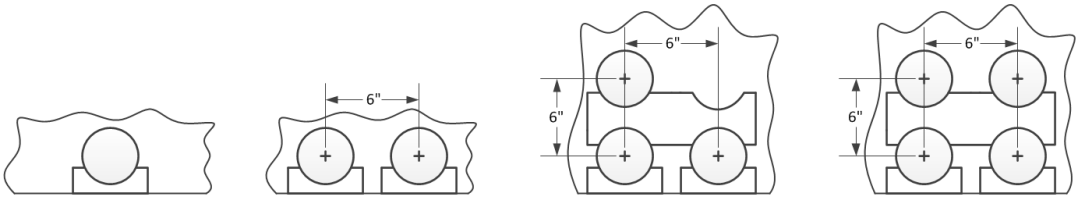
Company furnishes and installs:
K – Underground service lateral (lateral to be encased in concrete for 3000A services)
L – Watthour meter

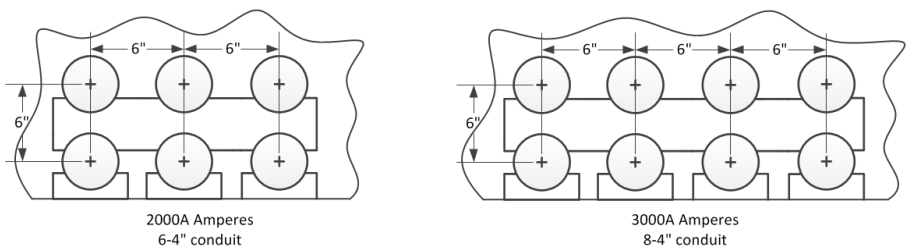


Typical Number, Size, and Layout of Service Lateral Conduits

Service Size	Number of Conduits	Size of Conduits	Number of Conduit Sweeps	Size of Conduit Sweeps (radius)
400	1	4”	1	36”
600	2	4”	2	36”
800	2	4”	2	36”
1200	3	4”	3	36”
1600	4	4”	4	36”
2000	6	4”	6	36”
2500	8*	4”	8*	36”
3000	8	4”	8	36”

Note: Conduit is required for all service laterals 1200A and above. Conduit may be required for service laterals under 1200A.
* 2500A Service will be treated as a 3000A service





Load Factor Calculation

For services greater than 1600 amperes and for services using 100% rated breakers, the % Load Factor needs to be calculated as follows:

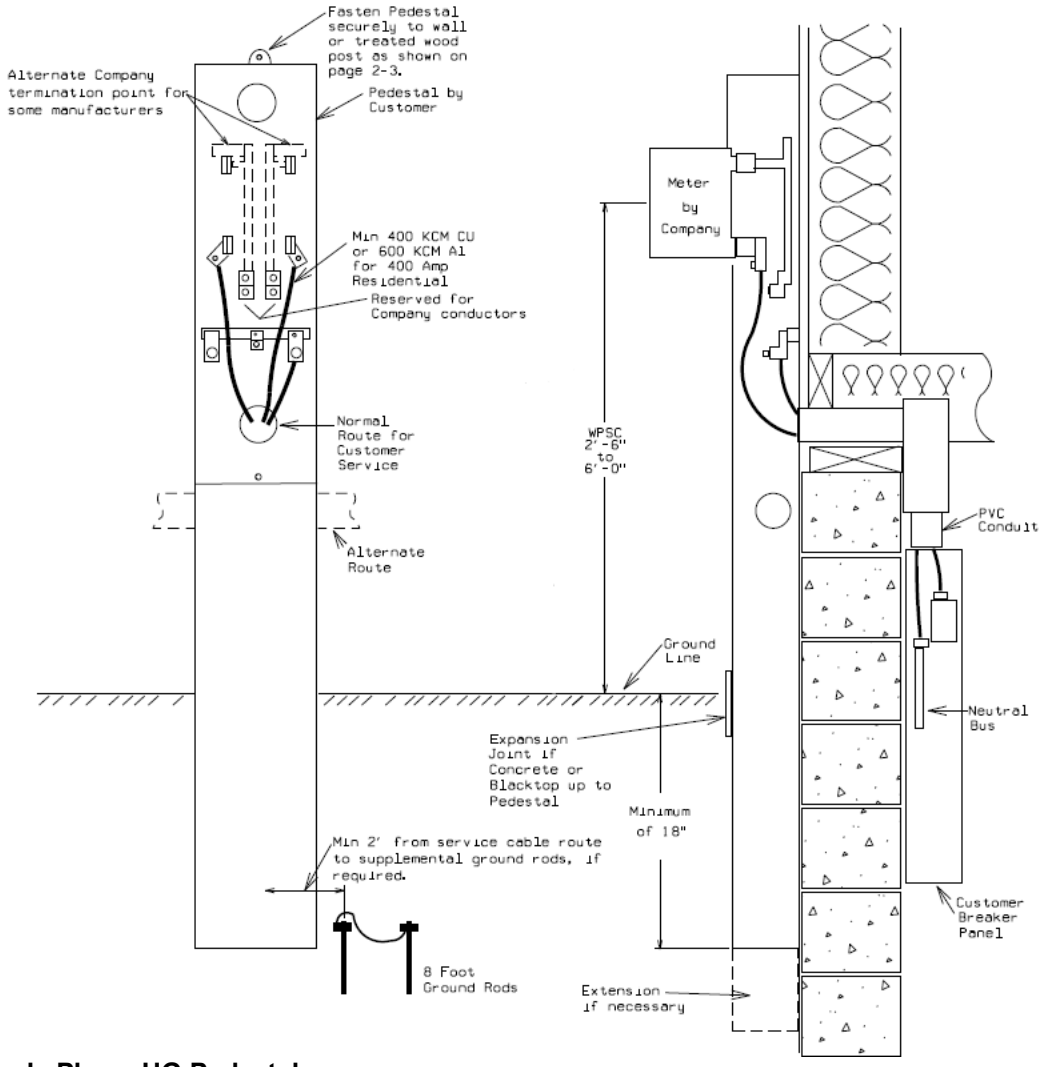
$$\%\ \text{Load Factor} = \frac{\text{Average Load of Daily Cycle}}{\text{Daily Maximum 1 Hour Average}} \text{ x } 100$$

Where: The “Average Load of Daily Cycle” is equal to the sum of the average hourly current (in amperes) in a 24-hour period divided by 24. The “Daily Maximum 1 Hour Average” is equal to the highest average hourly current (in amperes).

Once the % Load Factor has been determined, provide the % Load Factor with your service application.

If a high load factor is expected, an engineering analysis may be required. Please contact the local Company job representative if the load factor is expected to be higher than 80%.

3-2 320 Amp Single-Phase UG



320 amp Single Phase UG Pedestals

Milbank	U1748-O-WI	Ext. S1848
Schneider Electric	1009018	Ext. 1009023 (18”) or 1009026 (30”)
Cutler Hammer	1009018-CH	Ext. 1009023-CH (18”) or 1009026-CH (30”)
Midwest	1009018-MEP	Ext. 1009023-MEP (18”) or 1009026-MEP (30”)
Durham	1009018	Ext. 1009023 (18”) or 1009026 (30”)
Landis & Gyr	47604P-9WI	

320 amp Single Phase UG Pedestal with Two 150 amp or 200 amp Mains

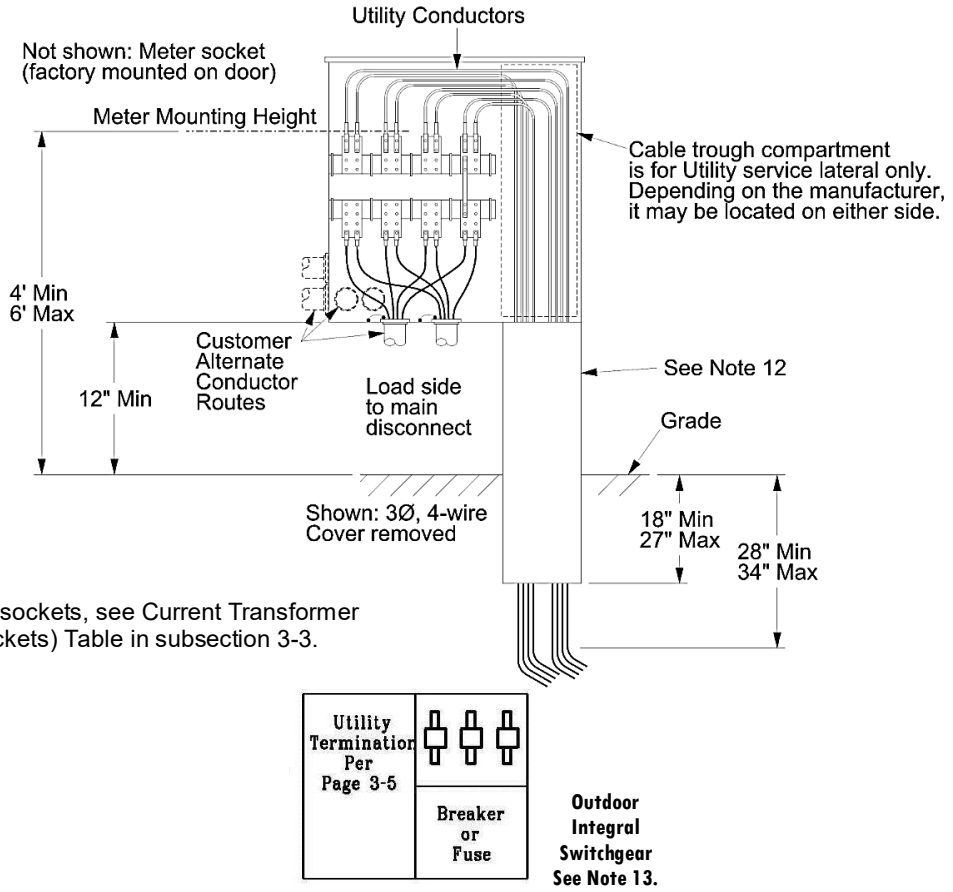
Durham	1009017	Ext. 1009022 (18”) or 1009025 (30”)
Cutler Hammer	1009017-CH	Ext. 1009022-CH (18”) or 1009025-CH (30”)
	1009020-CH (2)	Ext. 1009022-CH (18”) or 1009025-CH (30”)
Milbank	U3849-O-2/200 (1)	Ext. S1848
	U6231-O-2/200-K3L	Ext. S1848

(1) Requires K1539 line side set screw kit \, S1848 pedestal extension, and K4802 anti-inversion kit installed in upper right meter jaw.
(2) Pedestal uses two 150 amp Main Breakers

Notes:

1. This is a 320 class meter. Designed for 320 amp continuous and 400 amp intermittent. The above are possible acceptable catalog numbers. Extensions only needed if required for height reasons.
2. 320 amp meter sockets are acceptable for OH if UL listed, ringless, have a bypass lever, and have no cover over the meter.
3. Service entrance conductors shall exit the pedestal below the lowest live part and above grade.

3-3 400+ Amp, 1 or 3 Phase Transockets



For approved transockets, see Current Transformer Metering (Transockets) Table in subsection 3-3.

Notes:

1. The customer provides an approved transocket.
2. The transocket shall be mounted outside.
3. **Note the change in location of the customer and utility conductor terminations as shown above. The Company will terminate on top for both OH and UG installations. Consult the Company with any questions.**
4. CT metering is required for 400 amp and larger single phase, 400 amp and larger 120/208 three phase, and 400 amp and larger 277/480 three phase. With CT metering, there are several options: the use of a transocket, CTs in switchgear (see subsections 5-6 and 5-7), or overhead CT metering (see subsection 5-8).
5. Service laterals 1200 amp and larger will be required to be in conduit. The Company will install and own the conduit. The customer shall install a raceway. Only utility conductors are allowed in the service lateral entrance raceway. If not using a raceway, 4" Rigid metallic conduit with 90° elbow, 36" radius, shall be provided for direct burial service and conduit to extend 28" to 34" below grade. For concrete encased service, customer to provide 4" rigid metallic conduit to grade. Grounded bushings or hubs are required to be used with metallic conduit.
6. The transocket must be bonded per NEC 250.102. Consult the Company for transocket bonding requirements on three wire 240 volt three phase and three wire 480 volt three phase installations.
7. In four wire 120/240 three phase installations, the wild leg shall be identified with orange tape or other acceptable means.
8. See subsection 3-11 on Fault Current information.
9. Minimum clear space in front of the cabinet and/or meter shall be 2 feet beyond the cover in the extended position or a minimum of 3 feet, whichever is greater.
10. The Company may require conduit for services under driveways and parking lots.
11. Because of settling problems, it is necessary for the customer to provide adequate compaction for disturbed soils below 30 inches. This is soil below the normal underground service burial depth. This needs to be done with sand or gravel. Frozen material and non-compacted clay are not acceptable. See also NEC 300.5(J).
12. Integral switchgear installations need to be approved by the Company, if not already on the approved list. These installations need to be capable of accommodating an ABB Type CLC window current transformer. The switchgear manufacturer provides the bus bar and CT support with the switchgear. See section 5 for further requirements.
13. Metallic conduit sweeps for Company service lateral cable shall be provided with end bells to prevent damage to cable insulation.
14. 4-wire 120/240 volt delta, 3-wire 240 volt delta and 3-wire 480 volt delta services are legacy service voltages and not available for upgrade or new services.

3-3 Underground Service Transockets (Cont'd)

Service Applications

Phase	Wire	Voltage	Max. Amperage
1Ø	3-Wire	120/240 Volts	800 A
3Ø	3-Wire	240 Volts	3000 A
3Ø	3-Wire	480 Volts	3000 A
3Ø	4-Wire	208Y/120 Volts	3000 A
3Ø	4-Wire	480Y/277 Volts	3000 A

Note:
Galva Closure (RJB) was purchased by Milbank; an "M" was added to the existing RJB catalog numbers.
AMP stands for American Midwest Power.
Cable raceways for use with underground service laterals are highly encouraged.

Current Transformer Metering (Transockets) with Underground Service Lateral

Supplier	Ampere Rating	Transocket Catalog Numbers		
		120/240 Volts, 1Ø, 3W	240 Volts, 3Ø, 3W 480 Volts, 3Ø, 3W	208Y/120 Volts, 3Ø, 4W 480Y/277 Volts, 3Ø, 4W
AMP	400 600 800 1200 1600 2000 2500 3000	WECT4-3L6 WECT6-3L6 WECT8-3L6	WECT4-3L8 WECT6-3L8 WECT8-3L8 WECT12-3L8 WECT16-3L8 WECT20-3L8 WECT25-3L8 WECT30-3L8	WECT4-4L13 WECT6-4L13 WECT8-4L13 WECT12-4L13 WECT16-4L13 WECT20-4L13 WECT25-4L13 WECT30-4L13
Erickson	400 600 800 1200 1600 2000	WE-1182-3 WE283-3-USG CUCT81	WE-1182-4 WE283-4-USG CUCT83 CUCT123 CUCT163 WECT203-SG	WE-1182-5 WE283-5-USG CUCT84 CUCT124 CUCT164 WECT204-SG
Milbank	400 600 800 1200 1600 2000 3000	WEM-403-6 WEM-603-6UG WEM-803-6UG	WEM-403-8 WEM-603-8UG WEM-803-8UG WEM-1203-8UG WEM-1603-8UG WEM-2003-8UG	WEM-404-13 WEM-604-13UG WEM-804-13UG WEM-1204-13UG WEM-1604-13UG WEM-2004-13UG WEM-3004-13UG

Current Transformer Metering (Transockets) With Disconnect for Overhead or Underground Service

Supplier	Ampere Rating	Current Transformer Cabinet with Disconnect Catalog Numbers		
		120/240 Volts, 1Ø, 3W	240 Volts, 3Ø, 3W 480 Volts, 3Ø, 3W	208Y/120 Volts, 3Ø, 4W 480Y/277 Volts, 3Ø, 4W
Amp	400 – 1200	WEMCT Series WESCT Series (3)	WEMCT Series WESCT Series (3)	WEMCT Series WESCT Series (3)
Cutler-Hammer	400 – 800	CTAP Series CTAT Series		CTAP Series (1) CTAT Series (1)
Erickson	400 – 1200 1200	WECT_ _ Series	WECT_ _ Series	WECT_ _ Series WECT_ _ Series
Power Distribution	400 – 800 1200 1600	WE_ 013 Series	WE_ 033 Series WE12033	WE_ 034 Series WE12034 WE16034
Milbank	400-800 400	WEMCT _ _ Series WEM-CT_ _ Series (2)	WEMCT _ _ Series WEM-CT_ _ Series (2)	WEMCT _ _ Series WEM-CT_ _ Series (2)

(1) For 208Y/120 volt use only. Must be used with a termination compartment or main switch.
(2) Has a fused pull-out switch or circuit breaker as the main disconnect device.
(3) Only 2 circuits may leave the CT compartment.

3-3 Underground Service Transockets (Cont'd)

Raceways for use with Underground Service Laterals, 400-1600 Amps, All Voltages

Supplier	Amp Rating	Raceway Catalog Number
AMP	800	WW (Available in 36", 48" & 60" lengths.)
Erickson	800	USR (Available in 36", 47" & 59" lengths.)
Milbank	800	CCM (Available in 36", 48" & 60" lengths.)
AMP	1600	WWL (Available in 18" & 36" lengths.)
Erickson	1600	USRL (Available in 24", 36", 42" & 54" lengths.)
Milbank	1600	CCLM (Available in 22", 36", 48" & 60" lengths.)

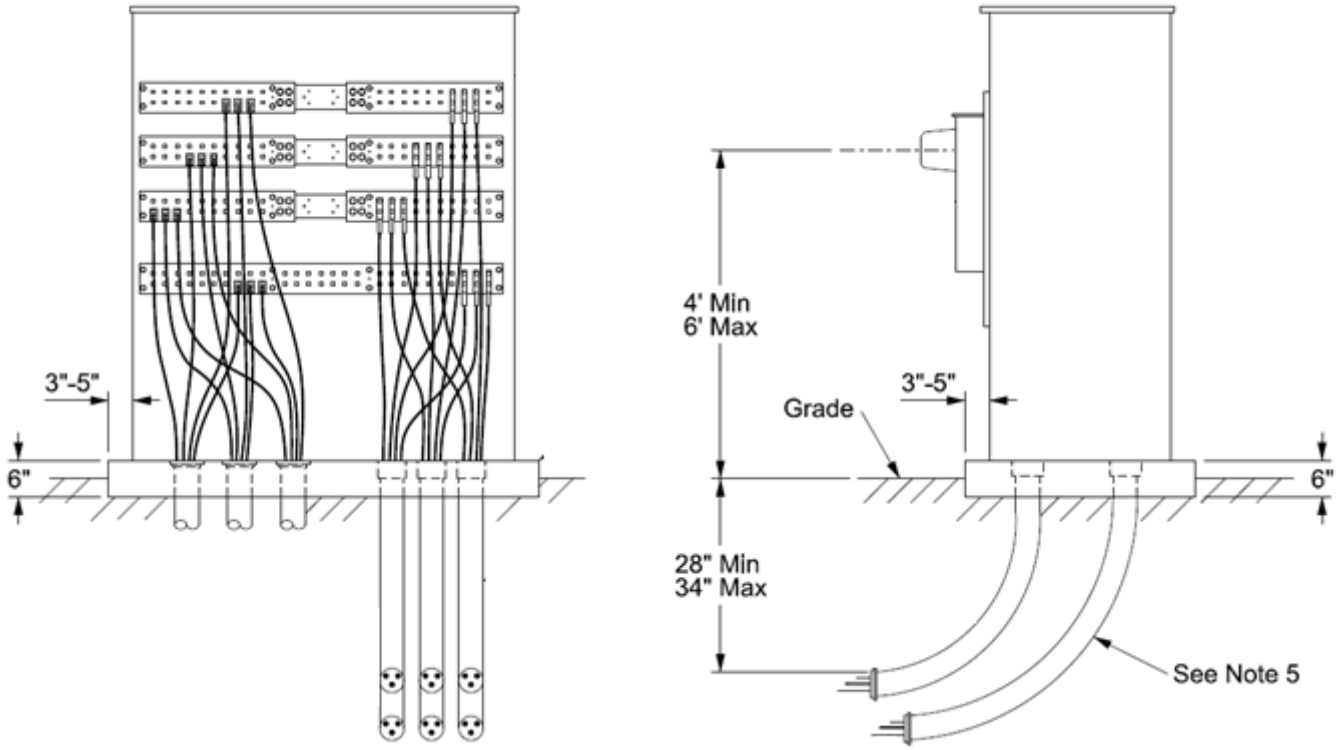
Note: Raceways can be paralleled for services larger than 1600 amps and installed per manufacturer's requirements

Current Transformer Metering (Transockets) with Overhead Service Entrance

Supplier	Ampere Rating	Transocket Catalog Numbers		
		120/240 Volts, 1Ø, 3W	240 Volts, 3Ø, 3W 480 Volts, 3Ø, 3W	208Y/120 Volts, 3Ø, 4W 480Y/277 Volts, 3Ø, 4W
AMP	400 400/600 800 1200 1600 2000	WETCTS4-3L-6 WETCT46-3L-6 WETCT8-4L-6	WETCTS4-4L-8 WETCT46-4L-8 WETCT8-4L-8 WETCT12-4L-8 WETCT16-4L-8 WETCT20-4L-8 (1)	WETCTS4-4L-13 WETCT46-4L-13 WETCT8-4L-13 WETCT12-4L-13 WETCT16-4L-13 WETCT20-4L-13 (1)
Erickson	400 800 1200 1600 2000	WE-1182-3 WE283-3	WE-1182-4 WE283-4 WECT123 WECT163 WECT203 (1)	WE-1182-5 WE283-5 WECT124 WECT164 WECT204 (1)
Milbank	400 600 800 1200 1600 2000	WEM-403-6 WEM-603-6 WEM-803-6	WEM-403-8 WEM-603-8 WEM-803-8 WEM-1203-8 WEM-1603-8 WEM-2003-8 (1)	WEM-404-13 WEM-604-13 WEM-804-13 WEM-1204-13 WEM-1604-13 WEM-2004-13 (1)

(1) Obtain approval from the local Company office.

3-4 Padmount 400+ Amp Transocket



Notes:
1. Only Company cable is allowed on the side of the cabinet where the service lateral enters the compartment.
2. The transocket shall be mounted outside.
3. The customer provides the transocket, conduit sweeps and the concrete pad. The concrete pad shall be a minimum of 6" thick and 3-5" wider and deeper than the transocket.
4. Conduit shall extend to be slightly higher than level with the top of the concrete pad (no more than 3" higher, NEC 408.5). Metallic conduit is not required for padmount transockets. If metallic conduit is used, it shall be bonded.
5. The conduit sweeps shall be oriented to face the transformer. Schedule 40 PVC conduit shall extend slightly higher than level with the top of concrete pad (no more than 3" higher). Customer to provide 4" 90 elbow with 36" radius. See subsection 3-1 for conduit details and the layout drawing provided by the Company for orientation.
6. The transocket must be bonded per NEC 250.102. Consult the Company for bonding requirements on three wire 240 volt three phase and three wire 480 volt three phase installations.
7. In four wire 120/240 three phase installations, the wild leg shall be identified with orange tape or other acceptable means.
8. See subsection 3-11 on Fault Current information.
9. Minimum clear space in front of the cabinet and/or meter shall be 2 feet beyond the cover in the extended position or a minimum of 3 feet, whichever is greater.
10. The Company may require conduit for services under driveways and parking lots.
11. Because of settling problems, it is necessary for the customer to provide adequate compaction for disturbed soils below 30 inches. This is soil below the normal underground service burial depth. This needs to be done with sand or gravel. Frozen material and non-compacted clay are not acceptable. See also NEC 300.5(J).
12. For available service sizes and approved transformer rated meter sockets, see the Service Applications table on page 6 and Transformer Rated Meter Sockets table on page 9.

Pad-Mounted Current Transformer Metering (Transockets) with Underground Service Lateral

Supplier	Ampere Rating	Transocket Catalog Numbers		
		120/240 Volts, 1Ø, 3W	240 Volts, 3Ø, 3W 480 Volts, 3Ø, 3W	208Y/120 Volts, 3Ø, 4W 480Y/277 Volts, 3Ø, 4W
AMP	400-800 1200 1600 2000 2500 3000	WESCC-4/8-3ACTL6	WESCC48-3ACTL8 WESCC12-3ACTL8 WESCC16-3ACTL8 WESCC20-3ACTL8 WESCC25-3ACTL8 WESCC30-3ACTL8	WESCC-48-4ACTL13 WESCC12-4ACTL13 WESCC16-4ACTL13 WESCC20-4ACTL13 WESCC25-4ACTL13 WESCC30-4ACTL13
Erickson	2000 2500 3000		PMCTCC4610WE PMCTCC4611WE PMCTCC4612WE	PMCTCC4610N-WE PMCTCC4611N-WE PMCTCC4612N-WE
Milbank	400 600 800 1200 1600 2000 3000	WEM-403-6PM WEM-603-6PM WEM-803-6PM	WEM-403-8PM WEM-603-8PM WEM-803-8PM WEM-1203-8PM WEM-1603-8PM WEM-2003-8PM	WEM-404-13PM WEM-604-13PM WEM-804-13PM WEM-1204-13PM WEM-1604-13PM WEM-2004-13PM WEM-3004-13PM

Transformer Rated Meter Sockets

Supplier	Socket Catalog Numbers		
	120/240 Volts, 1Ø, 3W 6 Terminal	240 Volts, 3Ø, 3W 480 Volts, 3Ø, 3W 8 Terminal*	208Y/120 Volts, 3Ø, 4W 480Y/277 Volts, 3Ø, 4W 13 Terminal
AMP	UC7532-XL	UC3887-XL	UC3889-XL
Erickson	W-130	W-330	W-340
Brooks Utility Products			601U3010C13-1554
Milbank	UC7532-XL	UC3887-XL	UC3889-XL

*3-Wire, 120/280V, 1Ø uses an 8 terminal socket

3-5 Space Required to Terminate in Service Entrance Panels & Switchgear

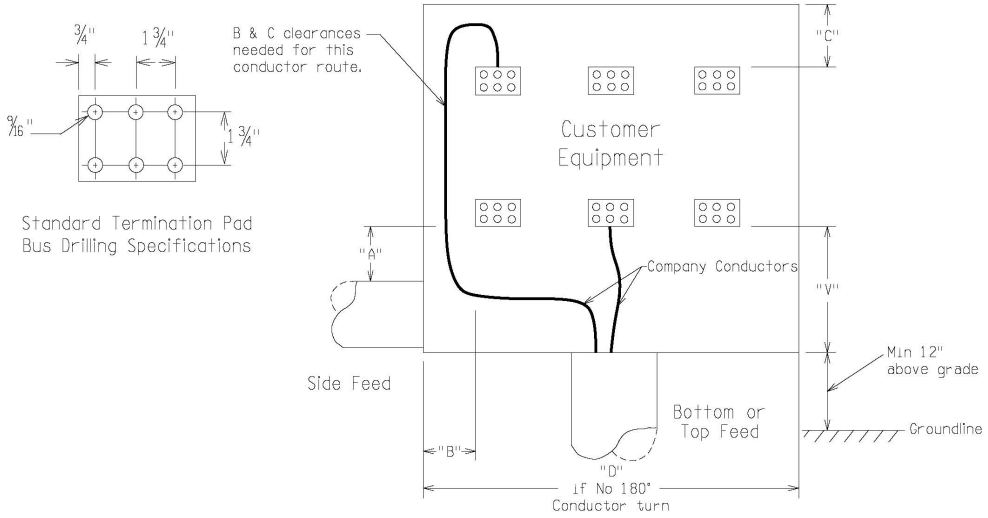


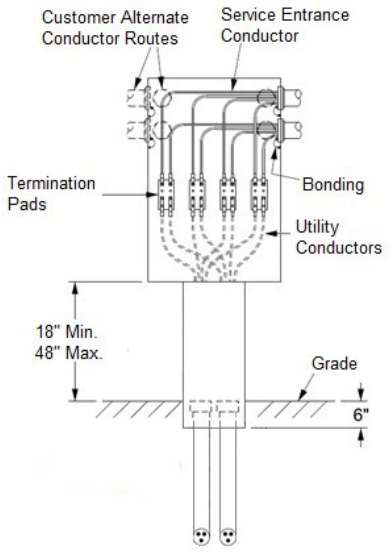
Table 1 – Standard Conductor and Conduit Sizes 5

Switchgear (Amps)	Phases	No. & Size Conductors Per Phase Aluminum	No. of Conduits and Size (in.) Conduit Run	"V"	"A"	"B"	"C"	"D"
400	1	1-350	1-4"	18"	12"	5"	12"	9"
400	3	1-350	1-4"	18"	12"`	5"	12"	11"
600	1	2-350*	2-4"	18"	18"	8"	16"	10"
600	3	2-350*	2-4"	18"	18"	8"	16"	12"
800	1	2-750+	2-4"	24"	24"	10"	18"	15"
800	3	2-750+	2-4"	24"	24"	10"	18"	19"
1000	3	3-750+	3-4"	30"	30"	14"	22"	35"
1200	3	3-750+	3-4"	30"	30"	14"	22"	35"
1600	3	4-750+	4-4"	36"	36"	-	-	40"
2000	3	6-750+	6-4"	42"	42"	-	-	40"
2500	3	8-750+	8-4"	42"	42"	-	-	40"
3000	3	8-750+	8-4"	42"	42"	-	-	40"

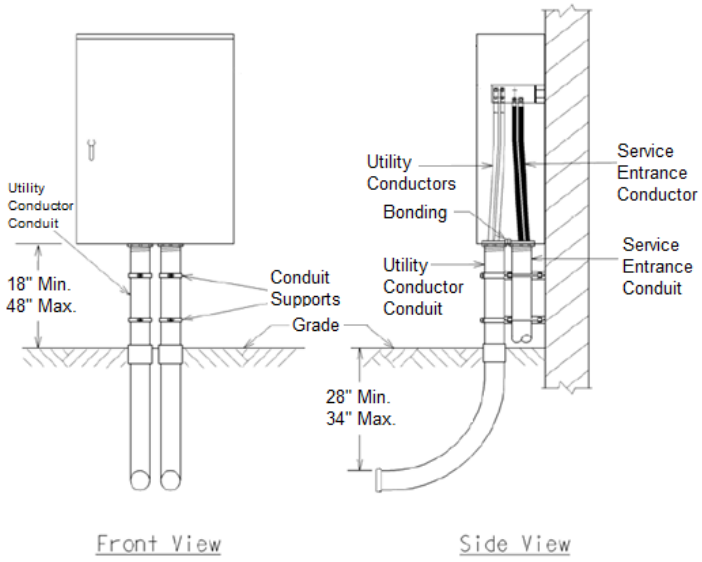
* 1-750 also acceptable, only 1-4" conduit is needed when using 1-750
+ Std. is 350 neutral

Notes:
1. This page deals exclusively with Company conductors. Consult the Company when planning switchgear installations.
2. The company uses 90°C conductor and will only terminate in a main terminal enclosure when used in conjunction with a lug landing pad.
3. "V" dimension for 3/0 and 350 comes from NEC Table 312.6(B).
4. "B" dimension based on NEC 312.6(A). "C" dimension based on NEC 312.6(B). 180 degree cable bends are only allowed by the Company through 600 Amp. Consult the Company if you have such a situation with a larger entrance.
5. If these minimum termination dimensions cannot be met, it may be necessary to use a separate termination enclosure per subsection 3-6 or 3-7.
6. This table gives standard Company conductor sizes. Customers must size their service entrance conductor based on the NEC. Note things such as Table 310.16 on general conductor ampacities, Table 310.15(B)(2)(a) on derating for more than three current-carrying cables in a raceway, duct configurations for over 2KV cables in Figure 310.60, Article 376 and 378 on raceway fill, etc.
7. Consult the Company when planning switchgear installations.
8. "D" Dimension based on terminator widths and 1" phase spacing. This applies only to single direction termination. If some conductors must turn a 180 degree to terminate, add dimension "B" as necessary.
9. One additional conduit shall be required where potential problems may occur under blacktop, concrete, or building structure. Additional considerations shall be given for rocky conditions.
10. Metering in switchgear is non-standard and only allowed at the company's sole discretion in unusual situations. **Prior company approval shall be received before a customer proceeds with this type of installation.**

3-6 Termination Compartment



Bottom Entry, Top Exit



Bottom Entry, Bottom Exit

Notes:
1. See subsection 3-3 for bonding requirements between the neutral and the termination enclosure.
2. Due to settling problems, it is necessary to provide adequate compaction under normal UG service conductor depth (30") for disturbed soils that needs to be done with sand or gravel. Frozen material and uncompacted clay are not acceptable.
3. Metallic conduit sweeps for Company direct buried service lateral cable shall be provided with end bells to prevent damage to cable insulation.
4. Service laterals 1200 amps and larger will be required to be in conduit. The Company will install and own the conduit. The customer shall install a raceway or 4” rigid metallic conduit to grade. An example of both options is shown above.
5. See subsection 5-5 for Multiple Metering Clearances.
6. All equipment downstream of the termination cabinet must be rated for the available fault current of the rating of the termination cabinet service entrance size.
7. Meter sockets and service disconnects shall be installed within 50’ of the termination enclosure. The Customer needs to obtain permission from the Company if installations between termination enclosure and meter location exceeds 50’.
8. Customer is responsible to provide conduit risers and sweeps. See subsection 3-1 for conduit details and the layout drawing provided by the Company for orientation.

For Use Where Both the Service Lateral and the Load Conductors Enter the Bottom of the Compartment (Non-Padmount)

Supplier	Ampere Rating	Catalog Numbers		
		120/240 Volt 1Ø, 3W	240 or 480 Volt 3Ø, 3W	208Y/120 Volt 480Y/277 Volt 3Ø, 4W
AMP (4)	400	WETC4-3A	WETC4-8A	WETC4-4A
	600	WETC6-3A	WETC6-8A	WETC6-4A
	800	WETC8-3A	WETC8-8A	WETC8-4A
	1000		WETC10-8A	WETC10-4A
	1200		WETC12-8A	WETC12-4A
	1600		WETC16-8A	WETC16-4A
	2000		WETC20-8A	WETC20-4A
Erickson	400	WETB-365N	WETB-365	WETB-465N
	800	WETB-367N (1)	WETB-367 (1)(3)	WETB-467N (1)(3)
	1200		WETB-368 (2)(3)	WETB-468N (2)(3)
	1600		WETB-369 (2)(3)	WETB-469N (2)(3)
	2000		WETB-3610 (2)(3)	WETB-4610N (2)(3)
Milbank	400	TBWEM-413-1	TBWEM-433-1	TBWEM-434-1
	600	TBWEM-613-2	TBWEM-633-2	TBWEM-634-2
	800	TBWEM-813-2	TBWEM-833-2	TBWEM-834-2
	1200		TBWEM-1233-3	TBWEM-1234-3
	1600		TBWEM-1633-4	TBWEM-1634-4
	2000		TBWEM-2033-6	TBWEM-2034-6
	3000		TBWEM-3033-8	TBWEM-3034-8

(1) If additional lugs are required use lug kit D-3481B.
(2) If additional lugs are required use lug kit C-686B.
(3) Suffix SG indicates optional side gutter for exit of load conductors.
(4) AMP termination compartment catalog numbers will be followed by L# depending on the customer lug choice.

For Use Above Grade Only, Where the Service Lateral Enters the Bottom of the Compartment and the Load Conductors Leave the Top

Supplier	Ampere Rating	Catalog Numbers		
		120/240 Volt 1Ø, 3W	240 or 480 Volt 3Ø, 3W	208Y/120 Volt 480Y/277 Volt 3Ø, 4W
AMP (4)	400 600 800 1000 1200 1600 2000	WETC4-3A WETC6-3A WETC8-3A	WETC4-8A WETC6-8A WETC8-8A WETC10-8A WETC12-8A WETC16-8A WETC20-8A	WETC4-4A WETC6-4A WETC8-4A WETC10-4A WETC12-4A WETC16-4A WETC20-4A
Cutler-Hammer	400 800 1200	1UGPB400R 1UGPB800R		3UGPB400R 3UGPB800R 3UGPB1200R
Erickson	400 800 1200 1600 2000 2500 3000	WETB-365N (1) WETB-367N (1)(2)	WETB-365 (1) WETB-367 (1)(2) WETB-368 (1)(3) WETB-369 (1)(3) WETB-3610 (1)(3) WETB-3611 (1)(3) WETB-3612 (1)(3)	WETB-465N (1) WETB-467N (1)(2) WETB-468N (1)(3) WETB-469N (1)(3) WETB-4610N (1)(3) WETB-4611N (1)(3) WETB-4612N (1)(3)
General Electric	400 800 1200	TMPU4R TMPU8R		TMP3U4R TMP3U8R TMP3U12R
Murray	400 800 1200	DPB042W DPB082W		DPB043W (5) DPB083W (5) DPB123W (5)
Milbank (1)	400 600 800 800 1200 1600 2000 2500 3000	TBM-413-1 TBM-613-2 TBM-813-2 TBM-813-3	TBM-433-1 TBM-633-2 TBM-833-2 TBM-833-3 TBM-1233-4 TBM-1633-5 TBM-2033-6 TBM-2533-7 TBM-3033-8	TBM-434-1 TBM-634-2 TBM-834-2 TBM-834-3 TBM-1234-4 TBM-1634-5 TBM-2034-6 TBM-2534-7 TBM-3034-8
Siemens	400 800 1200	WMMB1400 WMMB1800		WMMB3400 (5) WMMB3800 (5) WMMB31200 (5)

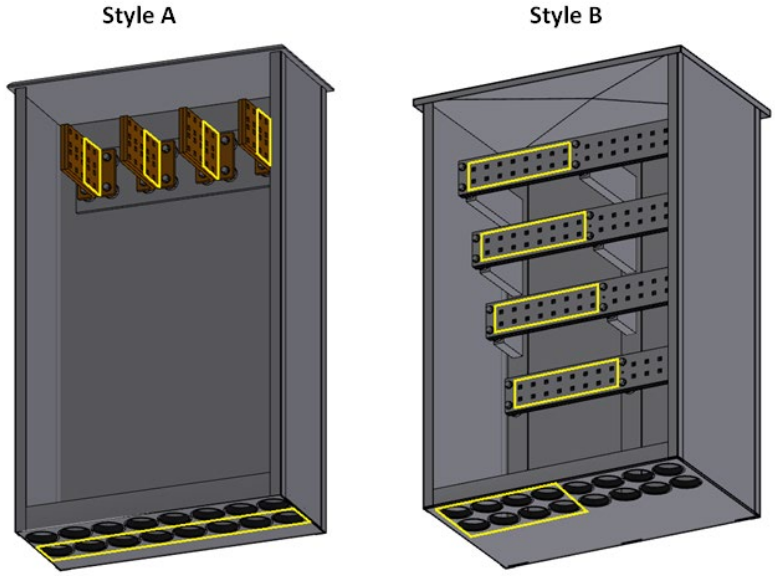
(1) Has adjustable termination pads that must be in the center or upper position.
(2) If additional lugs are required use lug kit D-3481B.
(3) If additional lugs are required use lug kit C-686B.
(4) AMP termination compartment catalog numbers will be followed by L# depending on the customer lug choice.
(5) 208Y/120V rated only.

Termination with Disconnect/Main Breaker/Fuse Combination Compartments

Supplier	Ampere Rating	Catalog Number		
		120/240 Volt, 1Ø, 3W	208Y/120 Volt, 3Ø, 4W	480Y/277 Volt, 3Ø, 4W
AMP	400–4000 (2)	FMU Series	FMU Series	FMU Series
Cutler Hammer	400 (1) 600 (2) 800 (2) 1200 (2) 1600 (2) 2000 (2)	1MFS400RUG 1PMB400RCL 1MFS600RUG 1PMB600RCL 1MFS800RUG 1PMB800RCL	3MFS400RUG 3PMB400RCL 3MFS600RUG 3PMB600RCL 3MFS800RUG 3PMB800RCL 3MFS1200RUG (5) 3PMBE1200R (6) 3MCB1600RUGCCLA 3MCB2000RUGCCLA	
Erickson	400 (1) 600 (2) 800 (2) 1200 (2) 1600 (2)	CM-BFMS325N CM-BFMS326N CM-BFMS327N	CM-BFMS425N CM-BFMS426N CM-BFMS427N CM-VLB448N-LE CM-VLB449N-LE (3) CM-VLB449N-LE-CM9 (4)	6CM-BFMS465N 6CM-BFMS466N 6CM-BFMS467N 6CM-VLB448NG6-LE 6CM-VLB449NG6-LE (3) 6CM-VLB449NG6-LE-CM9 (4)
General Electric/ABB	400 (1) 600 (2) 800 (2) 1200 (2) 1600 (2)	TMPFB4RCLL-MOD-1 TMPFB6RCLL-MOD-1 RMM1BE_6R RMM1FE_6RCLL TMPFB8RCLL-MOD-1 RMM1BE_8R RMM1FE_8RCLL	TMP3FB4RCLL-MOD-1 TMP3FB6RCLL RMM3BE_6R RMM3FE_6RCLL TMP3FB8RC LL RMM3BE_8R RMM3FE_8RCLL TMP3FB12RCLLT RMM3BE_12R RMM3BB16RCLL	
Murray	400 (1) 600 (2) 800 (2)	DT042UW DT062UW DT082UW	DT043UW DT063UW DT083UW	
Siemens (9)	400 (1) 600 (2) 800 (2) 1000(2) 1200(2)	WEB1400B WEB1600B WEB1800B	WEB3400B WEB3600B WEB3800B WEB31000B WEB31200B	
Square D	400 (1) 600 (2) 800 (2) 1000 (2) 1200 (2) 1600 (2)	EZM 1400 CBU/ FSU EZM 1600 CBU / FSU EZM 1800 CBU / FSU	EZM 3400 CBU / FSU EZM 3600 CBU / FSU EZM 3800 CBU / FSU EZM 31000 CBU / FSU EZM 31200 CBU / FSU/FSE EZM 31600 CBU / FSU	
T & B/Anchor	400 (1) 600 (2) 800 (2)	MFS4RNUG-TB MFS6RNUG-TB MFS8RNUG-TB	M3FS4RNUG-TB M3FS6RNUG-TB M3FS8RNUG-TB	

(1) Requires set screw connectors on line side lug landing pad for terminating the service lateral.
(2) Requires bolts or studs for WPS supplied 2-hole compression lugs on line side lug landing pad for terminating service lateral.
(3) 1200A horizontal main bus.
(4) 1600A horizontal main bus.
(5) 3 Phase main fusible switch.
(6) 3 Phase main breaker.

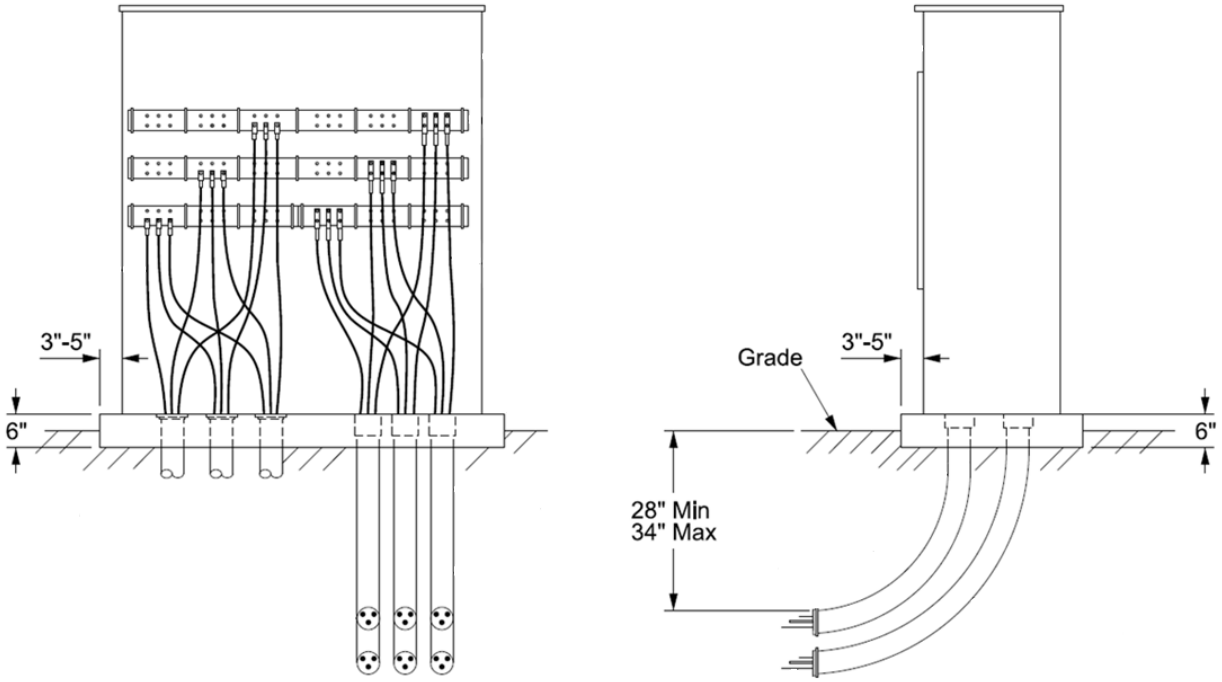
3-7 Padmount Termination Compartments



The above termination enclosures are general depictions showing two options for certain wiring installations. Consult the Company before using these options.

Type A: Terminations run perpendicular to the face of the enclosure. The customer uses the rear portion of the terminations and conduits; the front portion of the terminations and conduits shall be reserved for the Company. The drawing above shows an example (door removed), with the customer conduits and terminations outlined in yellow. Refer to Style B conduit installation for service sizes 1600-2000 amps.

Type B: Terminations run parallel to the face of the enclosure. The customer uses only one side of the terminations and conduits; the company uses the other. Follow the documentation provided by the Company to determine which side to use. The drawing below shows an example (door removed), with the customer conduits and terminations outlined in yellow (customer designated left side shown).



Notes:

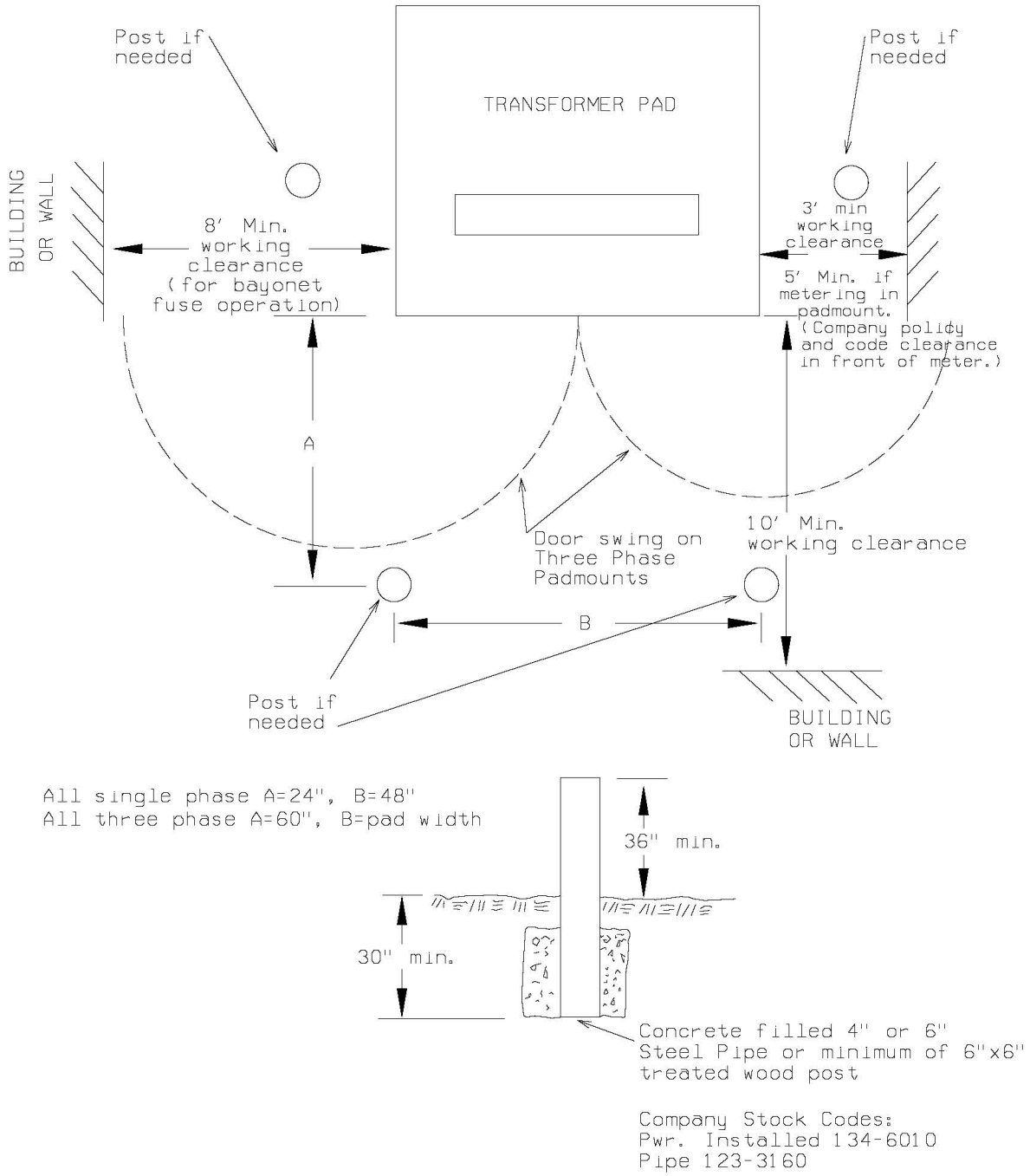
1. For use above grade only, where the service lateral enters the bottom of the compartment and the load conductors enter the bottom of the compartment. Only Company cable is allowed in the portion where the service lateral enters the compartment.
2. The termination compartment shall be mounted outside.
3. The customer provides the termination compartment, conduit sweeps and the concrete pad. The concrete pad shall be a minimum of 6” thick and 3-5” wider and deeper than the termination compartment.
4. Conduit shall extend to be slightly higher than level with the top of the concrete pad (no more than 3” higher, NEC 408.5). Metallic conduit is not required for padmount termination compartments. If metallic conduit is used, it shall be bonded.
5. The conduit sweeps shall be oriented to face the transformer. Schedule 40 PVC conduit shall extend slightly higher than level with the top of concrete pad (no more than 3” higher). Customer to provide 4” 90 elbow with 36” radius. See subsection 3-1 for conduit details and the layout drawing provided by the Company for orientation.
6. The termination compartment must be bonded per NEC 250.102. Consult the Company for bonding requirements on three wire 240 volt three phase and three wire 480 volt three phase installations.
7. In four wire 120/240 three phase installations, the wild leg shall be identified with orange tape or other acceptable means.
8. See subsection 3-11 on Fault Current information.
9. Minimum clear space in front of the cabinet shall be 2 feet beyond the cover in the extended position or a minimum of 3 feet, whichever is greater.
10. The Company may require conduit for services under driveways and parking lots.
11. Because of settling problems, it is necessary for the customer to provide adequate compaction for disturbed soils below 30 inches. This is soil below the normal underground service burial depth. This needs to be done with sand or gravel. Frozen material and non-compacted clay are not acceptable. See also NEC 300.5(J).
12. For available service sizes, see the Service Applications table in subsection 3-3.
13. Meter socket and service disconnect shall be installed within 50’ of the termination compartment. The Customer needs to obtain permission from the Company if installations between termination enclosure and meter location exceeds 50’.

Pad-Mounted Termination Compartments with Underground Service Lateral

Supplier	Ampere Rating	Catalog Numbers		
		120/240 Volts, 1Ø, 3W	240 Volts, 3Ø, 3W 480 Volts, 3Ø, 3W	208Y/120 Volts, 3Ø, 4W 480Y/277 Volts, 3Ø, 4W
AMP (1)	400-800 1200 1600 2000 2500 3000	WESCC-4/8-3A	WESCC-4/8-3A WESCC12-3A WESCC16-3A WESCC20-3A WESCC25-3A WESCC30-3A	WESCC-4/8-4A WESCC12-4A WESCC16-4A WESCC20-4A WESCC25-4A WESCC30-4A
Erickson	2000 2500 3000		PMCTCC3610-WETB PMCTCC3611-WETB PMCTCC3612-WETB	PMCTCC4610N-WETB PMCTCC4611N-WETB PMCTCC4612N-WETB
Milbank	400 600 800 1200 1600 2000 3000	TBWEM-413-1PM TBWEM-613-2PM TBWEM-813-2PM	TBWEM-433-1PM TBWEM-633-2PM TBWEM-833-2PM TBWEM-1233-3PM TBWEM-1633-4PM TBWEM-2033-6PM TBWEM-3033-8PM	TBWEM-434-1PM TBWEM-634-2PM TBWEM-834-2PM TBWEM-1234-3PM TBWEM-1634-4PM TBWEM-2034-6PM TBWEM-3034-8PM

(1) AMP termination compartment catalog numbers will be followed by “L#” depending on the customer lug choice.

3-8 Padmount Transformers and Working Clearances/Protective Posts



Notes:

1. For new installations, or rewires that require setting a new transformer, the Company will install and own the pad for the transformer. Consult the company with questions.
2. The minimum working clearance around pad-mounted transformers is 8 feet to the left, 10 feet in front, and 3 feet behind and to the right side of the pad-mounted transformer. If metering is inside the pad-mounted transformer, the minimum clearance to the right side is 5 feet. See the above diagram. These working clearances apply with or without protective posts. This working clearance includes fences, shrubs, gas risers or equipment, etc.
3. See subsection 3-9 for code clearances to combustible walls, doors, windows, intakes, etc.
4. Protective posts are **required** where the transformer is subject to vehicular traffic. Installation and cost of this protection is the responsibility of the customer. If the Company has to install this protection, appropriate charges will be billed to the customer.

3-9 Location of Pad-mounted Transformers near Buildings

This is reprinted from Vol. 1 of the Wisconsin State Electrical Code (PSC 114.317) (Dates back to 1965).
This is not required by code in Michigan but is a design standard for WPS.

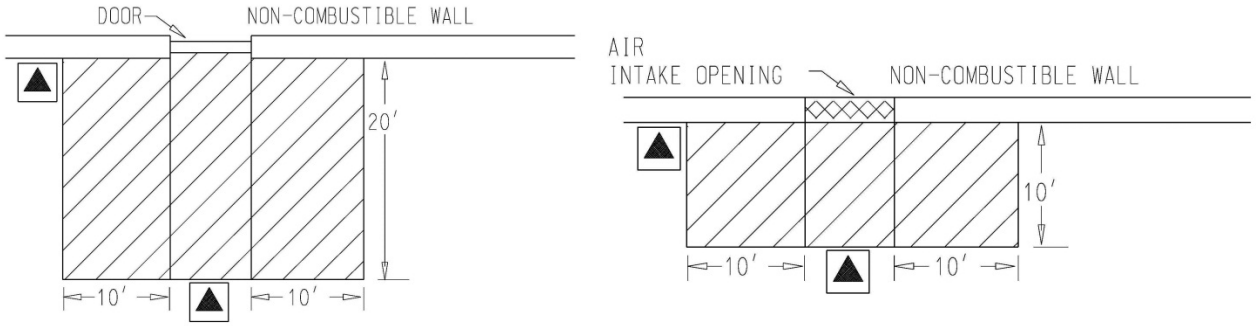
Non-combustible vs. Combustible Walls Definition

For the purposes of this section, combustible walls are walls of Type No. V buildings as determined by Wisconsin Building Code (Construction Classification IBC Chapter 6). All other walls are considered to be non-combustible.

The following is not part of code but is intended to help clarify the combustible wall definition:

Combustible	Non-combustible
- Wood frame - Wood frame with a brick veneer, stucco, thin layer of stone, etc. - Metal clad over a wood frame (typical pole shed)	- Masonry structures (generally a minimum of 4" thick) - Metal sheds (metal walls, metal roof, concrete floor) (can't have wood framing for the flooring, walls, or roof) - Poured concrete walls sandwiched between Styrofoam layers (Type IB) - Heavy timber construction (non-combustible material between timbers) (see definitions of heavy timber construction)

1. **<u>Non-Combustible Walls</u>**
   Pad-mounted oil-insulated transformers may be located directly next to non-combustible walls, but not closer than 3 ft. (Company policy), if the following clearances are maintained from doors, windows and other building openings.

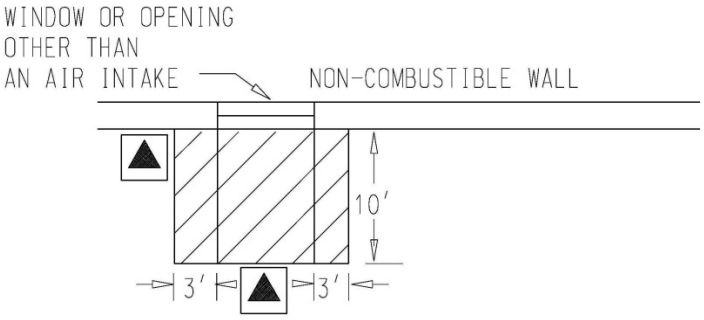


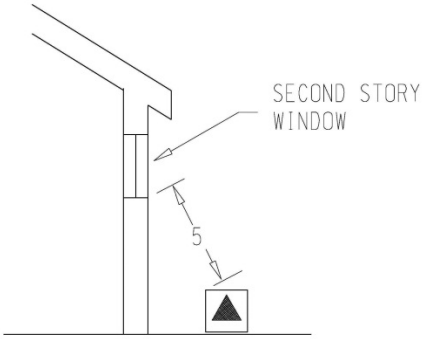
   a. **Doors**
   Pad-mounted oil-insulated transformers shall not be located within a zone extending 20 ft. outward and 10 ft. to either side of a building door.

   b. **Air Intake Openings**
   Pad-mounted oil-insulated transformers shall not be located within a zone extending 10 ft. outward and 10 ft. to either side of an air intake opening. Such transformers may be located within said zone beneath an air intake opening provided there is not less than 25 ft. diagonal between the transformer and said opening.

   c. **Windows Or Openings Other Than Air Intake**
   EXCEPTION. These window clearances do not apply to glass block or fire windows meeting the requirements of the WI Commercial Building Code (Fire Window, IBC Chapter 7, section 714.3).
      1. First Story
         Pad-mounted oil-insulated transformers shall not be located within a zone extending 10 ft. outward and 3 ft. to either side of a building window or opening other than an air intake.
      2. Second Story
         Pad-mounted oil-insulated transformers shall not be located less than 5 ft. from any part of a second story window or opening other than an air intake.

3-9 Location of Pad-mounted Transformers near Buildings (Cont'd)





2. **Combustible Walls**

   a. Pad-mounted oil-insulated transformers in sizes up to and including 100 KVA shall be located according to the provisions set forth for non-combustible walls.

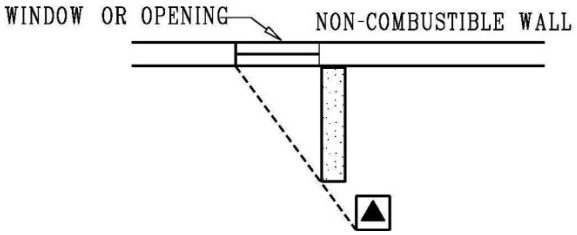
      Note: Installations with 75KVA three phase padmounts should be designed with upgrades to 150KVA in mind.

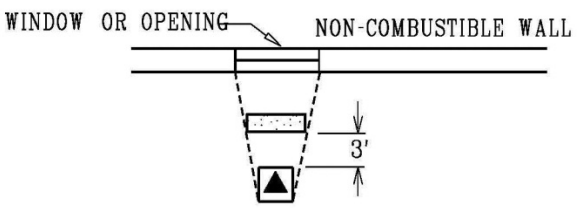
   b. Pad-mounted oil-insulated transformers in sizes above 100 KVA shall be located a minimum of 10' from the building wall, in addition to the clearances from building doors, windows and other openings set forth for non-combustible walls.

3. **Barriers**

If the clearances specified above cannot be obtained, a fire-resistant barrier may be constructed in lieu of the separation. Based on the State Building Code, a fire-rated barrier would have to be a minimum of a 4-inch solid masonry wall or a 12-inch hollow masonry wall. If a non-combustible barrier is part of the building exterior wall, consider the impact on the eve and the potential of fire access to the roof trusses. The following methods of construction are acceptable:

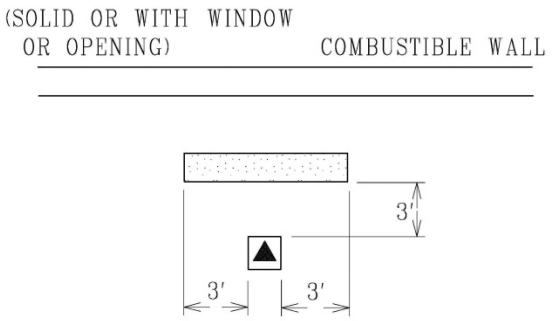
   a. **Non-Combustible Walls**
   The barrier shall extend to a projection line from the corner of the pad-mounted transformer to the farthest corner of the window, door or opening in question. The height of the barrier shall be 1' above the top of the pad-mounted transformer.





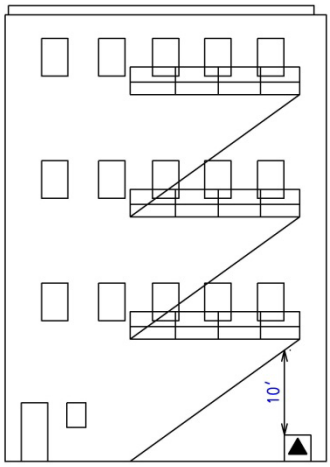
   b. **Combustible Walls**
   The barrier shall extend 3' beyond each side of the padmount transformer. The height of the barrier shall be 1' above the top of the padmount transformer.

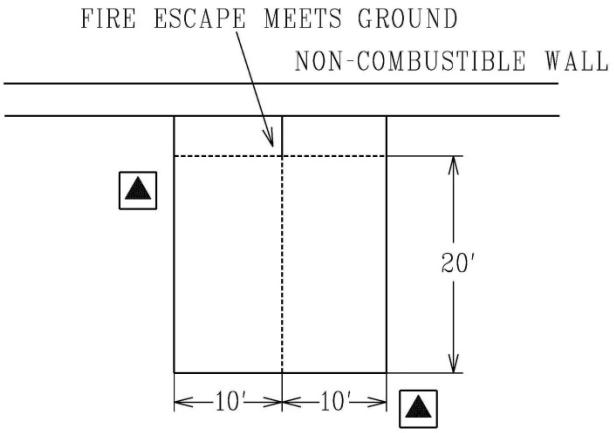
3-9 Location of Pad-mounted Transformers near Buildings (Cont'd)



4. **Fire Escapes**
Pad-mounted oil-insulated transformers shall not be located within a zone extending 20 feet outward and 10' on either side of the point where a fire escape meets the ground.

Pad-mounted oil-insulated transformers located beneath fire escapes shall have a vertical clearance of not less than 10 feet from the top of the transformer to the bottom of the fire escape.





5. See subsection 3-7 on how to reference the window in the concrete pad. This is critical for access, switching and conduit training.

6. **Generators WI SPS 316.700 & 316.701 (NEC 701.11)**
In Wisconsin, there is an additional requirement which reads as follows: "The enclosure of the alternate source of power located outdoors for emergency systems and legally required standby systems shall be located at least 10 feet horizontally from any combustible portion of a combustible building (Type III, IV, or V) and at least 20 feet from an outdoor electrical transformer, electrical metering, service equipment, or normal power distribution equipment. These dimensions may be reduced where a noncombustible barrier is installed that extends at least 3 feet beyond each side of the alternate power source and transformer. The height of the barrier shall be at least one foot above the top of the transformer, electrical metering, service equipment, or alternate power source, whichever is higher." "Emergency Systems" are usually systems in places of assembly that supply emergency exit lighting and serve essential ventilation, alarm systems, fire pumps, elevators, etc. "Legally Required Standby" generators are systems that provide power for heating, refrigeration, communications, ventilation, smoke removal systems, sewage disposal, lighting, and other industrial processes, that if stopped, would create hazards or hamper rescue or fire-fighting operations. In some cases, this may include emergency exit lighting. This does not include "Optional Standby" generator systems that are only needed to avoid discomfort, inconvenience, or process interruptions.

3-10 Multiple Metering

1. **General Meter Requirement**
   There is a lot of multiple metering equipment available. Because of this, the Company only requires the following minimum standards:
   a. Four jaw for single phase 120/240 volts.
   b. Rated at Least 100 amp each socket.
   c. Ringless.
   d. Sealable.
   e. Has at least Horn Bypasses. Manual bypass lever not required except if three phase.
   f. UL approved.
   g. No covers over the meters.
   h. Termination area for utility conductors meets requirements of subsection 3-5.

   Note the clearances on subsection 5-5 of the WPS Service Manual for large installations.

2. All metering shall be outside**.**

3. **Duplexes**
   The Company can only run one service to a duplex. This is required by NEC 230.2(A). This is required even though the garages may be between the dwelling parts of the duplex.

   NEC 210.25 (and WI PSC 113.0802 or 113.0803) requires a third meter for common areas (well pumps etc.) on duplexes. Effective with 1996 NEC (not enforced in Wisconsin until 2000/2001). SPS 316.210(5) makes an exception to this rule for upgrades on existing duplexes.

4. **Large Installations**
   Large multiple metering installations should follow the requirements on subsection 5-5 of the WEB version of the manual.

5. **Labeling**
   It is critical to label each meter socket with a permanent marking system, both inside and outside the meter socket. NEC 110.22.

6. **Pedestals**
   The Company requires pedestals for single phase underground metering because of frost heave problems. There are limited sources of duplex pedestals.
   Milbank U1783-0-KK
   Durham SEUAP2317-PPWI

7. **Grouping**
   The National Electric Code requires disconnects to be grouped.

3-11 Maximum Fault Currents

Voltage	Entrance Size	Pole or Pad-mounted Transformer	Fault Current at Transformer	Fault Current with 25 foot Service	Fault Current with 50 foot Service	Fault Current with 75 foot Service	Fault Current with 100 foot Service	Assumed Service Conductors	X/R Values at Secondary Side of Transformer		Assumed Transformer Total KVA Rating
									With Pole Transformer	With Pad-mounted Transformer	
Single Phase 120/240	200	Either	(3) 14,200	12,800	11,500	10,400	9,500	3c3/0	2	1.6	50
	400	Either	25,400	22,600	20,300	18,300	16,700	3c350	2.2	2.3	100
	600	Either	39,600	37,100	34,600	32,300	30,100	2-3c350	10.6	14.4	167
	800	Either	50,000	46,500	43,500	40,700	38,200	6-750	15.1	11.3	250
Three Phase 120/208	200	Either	15,700	12,100	9,700	8,100	6,900	4c3/0	1.4	2.3	75
	400	Either	35,400	27,400	21,600	17,500	14,700	4c350	2	8.4	150
	600	Either	57,300	46,500	38,100	31,800	27,100	2-4c350	2.2	8.1	300
	800	Either	57,300	48,600	41,800	36,600	32,400	8-750	2.2	8.1	300
	1200	Pad-mounted	67,200	61,000	55,700	51,000	47,000	12-750	xx	10.7	500
	1200	Pole*	71,500	64,500	58,500	53,400	49,000	12-750	10.6	xx	3-167
	1600	Pad-mounted	67,200	62,200	57,700	53,700	50,200	16-750	xx	10.7	500
	1600	Pole*	71,500	65,900	60,800	56,400	52,500	16-750	10.6	xx	3-167
	2000	Pad-mounted	67,200	63,000	59,200	55,700	52,500	24-750	xx	10.7	500
	2000	Pole*	99,700	90,800	83,000	76,200	70,300	24-750	15.1	xx	3-250
	3000	Pad-mounted	67,200	64,200	61,400	58,800	56,500	32-750	xx	10.7	500
Three Phase 277/480	200	Either	13,300	12,200	11,200	10,300	9,500	4c3/0	2	12.2	150
	400	Either	25,000	22,700	20,700	18,900	17,400	4c350	2.7	14.7	300
	600	Either	34,400	32,500	30,900	29,300	27,800	2-4c350	5.9	12.4	500
	800	Pad-mounted	34,200	32,700	31,400	30,100	28,900	8-750	xx	12.4	500
	800	Pole*	38,000	36,300	34,600	33,100	31,600	8-750	11.4	xx	3-250
	1200	Pad-mounted	34,200	33,400	32,700	32,000	31,400	12-750	xx	12.4	500
	1200	Pole*	47,800	46,400	45,000	43,800	42,500	12-750	15.3	xx	3-333
	1600	Pad-mounted	34,200	33,600	33,000	32,400	31,900	16-750	xx	12.4	1500
	1600	Pole*	60,700	58,900	57,200	55,500	53,900	16-750	14.4	xx	3-500
	2000	Pad-mounted	46,400	45,500	44,600	43,700	42,900	24-750	xx	9.5	2500
	3000	Pad-mounted	46,400	45,700	45,000	44,400	43,700	32-750	xx	9.5	2500

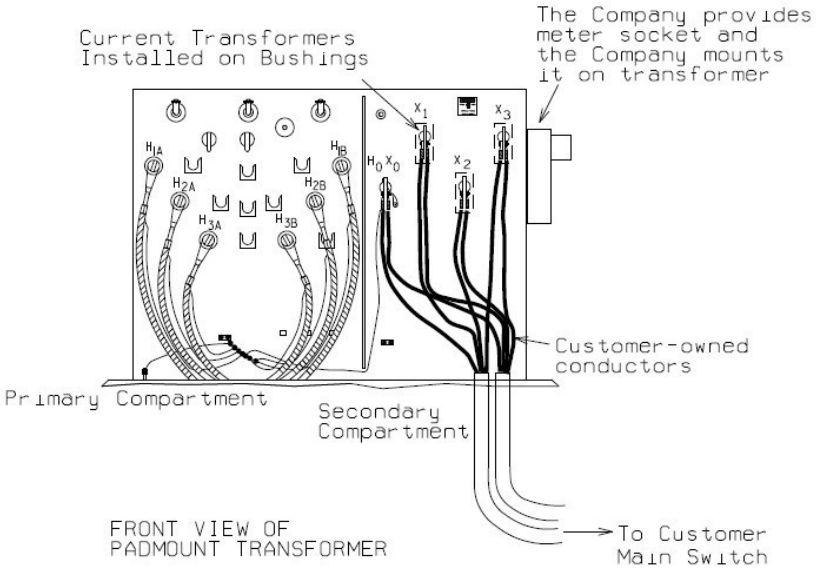
* Legacy service and not available for new services

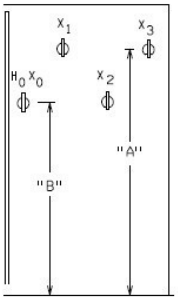
Note: This Table Applies Only for Cases with One Service Fed from a Transformer

Notes:

1. WARNING: This information assumes a dedicated transformer feeding one customer. If a transformer feeds a large entrance and a small service is also tapped from that transformer, the fault current will be much higher than shown here for the small entrance. Call the Company for information in this case.
2. These tables are worst-case fault currents. Fault currents depend on distance from substation, type of feeder, type (overhead vs. underground) and size of transformer, size and length of service, etc. Call the Company for information on specific locations, sizes and voltages not given, or regarding details for arc-flash analysis.
3. Minimum of 18 kA service entrance equipment required.

3-12 Metering in Padmounted Transformers





Transformer Size	"A"	"B"
150 KVA	"33"	"27"
225-500 KVA	"39"	"31"
750-2500 KVA	"54"	"46"

Notes:

1. **Approval must be obtained from the Company to use this metering option**. It is only available from dedicated (no other customers possible) three-phase padmounted transformers. **The service size must be 3-phase, 800 amp or larger**. The service can only be run to one building [in WI SPS 316.230(3)(a)].
2. The customer shall own, install and maintain the service. The Company will terminate the transformer end of the customer service conductors, if possible. Customer wire shall either be 750 kcmil AL, 350 kcmil AL or 500 kcmil CU. The maximum wire count is 8 wires per phase. See the table in this subsection for the number and size of secondary conduit sweeps the Company will provide. Let the Company know the size and number of service conductors.
3. The above drawing is a diagram showing the metering. See subsection 3-9 for details on padmount siting.
4. The meter socket will be provided by the Company at cost where it is mounted on the padmount transformer.
5. The Company will ground the meter socket.
6. **The customer equipment grounding bond cannot occur in the padmount transformer per NEC 250.24(A)(1).**
7. The customer is responsible for providing service conductor locates.
8. The customer may be responsible to provide wire, splices and lugs, when needed.

Instrument Transformer-Rated Meter Sockets (for CT Installations)
13 Terminal for 120/208 & 277/480 (Co. stock #136-1160)

Manufacturer	
Schneider Electric	TSS13-HO-SR1, USTS13-2B
Meter Devices	3040A-13
Milbank	UC7449-XL
Erickson	W-340
Landis & Gyr (Siemens)	9837-8503
Durham	USTS13-2B
Cutler Hammer	USTS13-2B-CH
Midwest	USTS13-2B-MEP

3-12 Metering in Padmounted Transformers (Cont'd)

Typical Number and Size of Service Lateral Conduit Sweeps the Company will Install

Service Size	Number of Conduits	Size of Conduits	Number of Conduit Sweeps	Size of Conduit Sweeps (radius)
400	1	4"	1	36"
600	2	4"	2	36"
800	2	4"	2	36"
1200	3	4"	3	36"
1600	4	4"	4	36"
2000	6	4"	6	36"
2500	8*	4"	8*	36"
3000	8	4"	8	36"

* 2500A Service will be treated as a 3000A service